

## **A study on mineralogical properties and quantitative measurement of soil erosion**

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This study aims to elucidate the relative importance of geological characteristics in relation to soil erosion. We analyzed soils on test beds constructed from granite regolith using XRD and SEM. The most common minerals in soil on the slopes are quartz, feldspars, illite, kaolinite, vermiculite, and iron oxides based on XRD data. In this study, we developed a smart sensor for real-time quantitative measurements of soil erosion at the watershed scale. The smart sensor consists of an ultrasonic sensor, a rainfall meter, a solar cell, an RTU (remote terminal unit), and a CDMA (code division multiple access). It was programmed to take a measurement every 30 minutes. Monitoring sensor equipment of soil erosion is made up solar panels, sensor unit, and conducting enclosure. The inside of the conducting enclosure using ultrasonic sensor which is constituted by a battery, RTU, and inverter for measuring the displacement of the surface at regular intervals. The soil depths measured by the smart sensor were compared with data from terrestrial LiDAR. Experimental results showed a strong correlation in the depth of soil erosion between LiDAR and the ultrasonic sensor for the period from 22 August to 11 October 2013. Furthermore, the correlation coefficient between soil erosion depth (mm) and soil erosion volume (m<sup>3</sup>) was 0.9063 in the lower region of the watershed and is 0.9868 in the upper region.

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